Observations on the Mines of Oak-feeding Species of *Phyllonorycter* (Lep.: Gracillariidae)

By Dr. M. W. HARPER[1] and Dr. J. R. LANGMAID[2]

Introduction

There has been confusion in the past over the identification of the mines of the oak-feeding species of *Phyllonorycter*. There are nine species in this country, but *P. saportella* Dup. has not been seen for some years, and these observations are confined to the remaining eight species. Observations were made on mines collected in the autumn in Herefordshire and Hampshire in 1975 and 1976. All species mine the under-surface of the leaves.

P. harrisella L.

Oval mines averaging 7 x 12 mm., variably positioned on the leaf, and occasionally on the leaf-margin causing the edge to fold (cf. *P. heegeriella*). Only 10% had a green patch of uneaten palisade tissue in the centre of the upper surface of the leaf. The under surface of the mine has a single central or off-central corrugation which runs nearly its whole length. It does not contort the leaf strongly.

The silken cocoon is strongly attached to both upper and lower epidermis. It has a tough texture which is reinforced with frass on its lateral and caudal aspects. When viewed against the light, this shows up as a characteristic U-shaped edging in the cocoon.

P. quercifoliella Zell.

This species produces a very similar mine to *P. harrisella*. There is no single character which can reliably separate the two species in the autumn generation. But P. F. Miller found that in the first generation mines, the cocoon was only attached to the upper epidermis, so that the frass covers the whole of the lateral and ventral surface. This will not show as a U-shaped cocoon but will appear uniformly dark. This feature does not appear in the autumn generation which are U-shaped, as in *P. harrisella*. We found that the green patch was present in approximately 50%.

P. messaniella Zell.

Similar to the two preceding species when the mine is on deciduous oak, but slightly smaller and, in our experience, never has a green patch. The cocoon is less tough but in other respects its construction is identical. This species emerges in the autumn and does not overwinter as a pupa.

P. muelleriella Zell.

The external features are again similar to the three preceding species, but the mine is slightly longer and contorts the leaf more strongly. A small variable green patch is present in 90%. A pronounced central corrugation is present in this species, which does not confirm the observation of the late D. W. H. Ffennell who stated that it was deeply and evenly

[1] The Cherry Orchard, Bullen, Ledbury, Herefordshire.
[2] 38 Cumberland Court, Festing Road, Southsea, Hampshire.

corrugated over the whole surface. The mines are sometimes multiple.

The cocoon is flimsy; frass-lined, but less so than in the preceding species, and attached to upper and lower epidermis. There are a few silk threads which run randomly within the mine, enmeshing some of the frass.

P. heegeriella Zell.

The smallest mine in this group, and usually less than 10 mm. long and situated at the leaf-margin, bending the edge over. Less than 10% were found in other positions. They do not have a green patch. Numerous small longitudinal ridges can be seen in the central part of the mine, probably responsible for the characteristic folding of the leaf edge.

The fine silken cocoon occupies the greater part of the mine. It is not frass-lined, the frass lying at the caudal end of the mine and outside the cocoon.

P. lautella Zell.

A long slender mine measuring 14-20 mm., situated between lateral nervures, often starting at the midrib, though seldom reaching the leaf-margin. The mines are frequently multiple, and contorting the leaf more strongly than any of the preceding species. Although an irregular green patch is sometimes present, the palisade is strongly fenestrated. The ventral surface shows a single strong corrugation with numerous lesser ridges on each side of it.

The cocoon is pale, semi-translucent, attached to the contorted upper epidermis, and only loosely to the lower. The frass is entirely separate from the cocoon, concentrated at the caudal end of the mine behind a pad of silk which is separate from the cocoon.

P. distentella Zell. (Figs. 1 & 3)

This species has the largest mine of the group. It usually extends from the midrib, between lateral nervures, and may even reach the leaf-margin, the length averaging 25 mm. High-

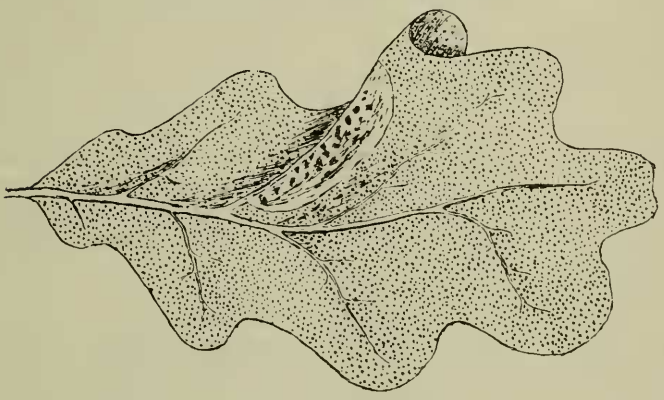

Fig. 1. *Phyllonorycter distentella* Zell. mine.
Uppersurface view on *Quercus petraea.*

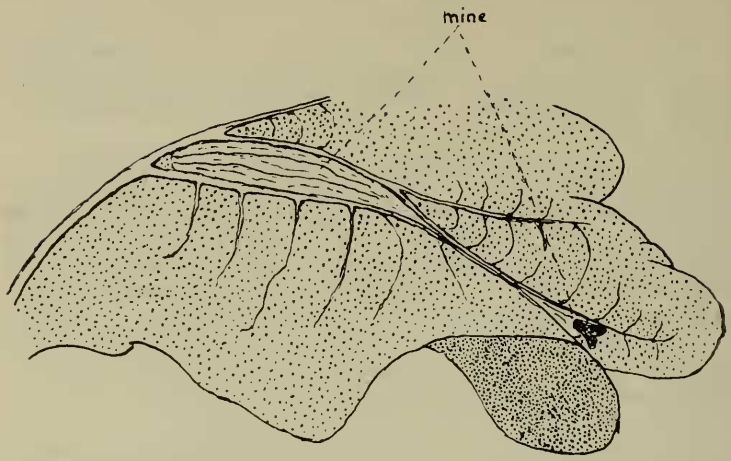

Fig. 3. *Phyllonorycter distentella* Zell. mine.
Undersurface view enlarged x 3 (approx.).

power magnification of the lower epidermis shows it to be finely and closely corrugated across its whole width, so that the two lateral nervures are drawn together. Indeed, so great is the contraction, that the nervures may even touch, while the upper epidermis is so balooned that the mine resembles a tube for much of its length. Frequently the leaf is grossly deformed. An irregular fragmented green patch is present.

There appears to be no cocoon within the mine, the interior of which contains a fine meshwork of silken threads. The frass, as in the preceding species, is placed behind a caudal pad of silk.

P. roboris Zell. (Figs. 2 & 4)

A large oval mine, average dimensions 7 x 18 mm., invariably with a near central green patch on the upper surface, and a macroscopically smooth and unwrinkled lower surface. On higher magnification, this proves to have a series of fine shallow spaced ridges.

The cocoon is pale, and is attached dorsally within the green patch, not extending beyond its margin. It has no contact with the lower epidermis, and the silken lower membrane of the cocoon is divided at its periphery into two layers. The outer layer is straight and stretches across to be attached to the edge of the green patch, while the inner layer is domed and attached within this. The frass is situated compactly behind the cocoon, without a silken pad.

It is difficult to be dogmatic about which species of oak is the primary foodplant for any particular species of *Phyllonorycter,* except *P. messaniella* whose first choice is *Q. ilex.* But from our own observations we have only bred *P. distentella, P. roboris, P. muelleriella* and *P. lautella* from *Q. petraea. P. harrisella, P. quercifoliella* and *P. heegeriella* were bred from *Q. petraea* and *Q. robur.*

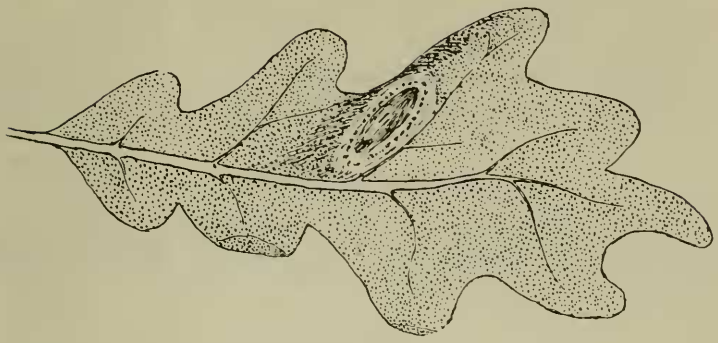

Fig. 2. *Phyllonorycter roboris* Zell. mine.
Uppersurface view on *Quercus petraea*.

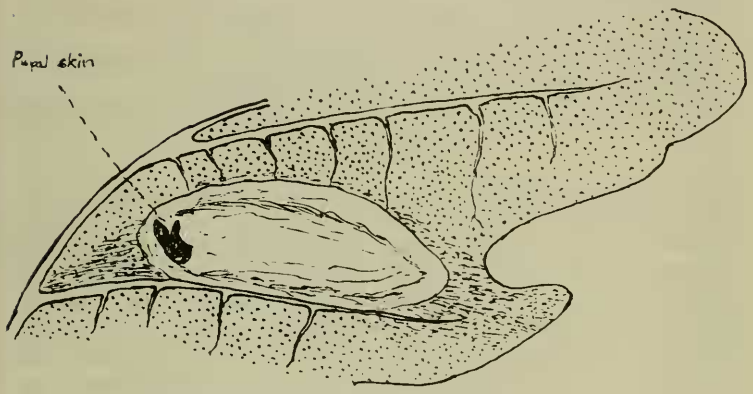

Fig. 4. *Phyllonorycter roboris* Zell mine
Undersurface view enlarged x 3 (approx.).

Tentatively, here follows a suggested key for oak-feeding *Phyllonorycter* mines, excluding *P. saportella.*

1. Cocoon incorporating frass 2
   Cocoon not incorporating frass 3
2. Smaller mine, imago emerging before winter ... *messaniella*
   Larger mine, pupa overwintering within mine 4
3. Under-surface of mine macroscopically smooth, upper-surface with pronounced green patch ..... *roboris*
   Under-surface of mine with corrugations 5
4. Cocoon flimsy, thinly frass-lined ..... *muelleriella*
   Cocoon tough, incorporating practically all of the frass ... 7
5. Mine small, usually at edge of leaf ..... *heegeriella*
   Mine large, between lateral nervures 6
6. Mine with strong central corrugation, leaf moderately contorted, mine length 15-20 mm. ..... *lautella*
   Mine evenly corrugated, leaf highly contorted, mine length 20-30 mm. ..... *distentella*

7. First generation mine with entirely frass-covered cocoon ..... *quercifoliella*
First generation mine with U-shaped frass ..... *harrisella*
Second generation mine with U-shape frass ..... *quercifoliella, harrisella*

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References

Bradley, J. D., Jacobs, S. N. A. and Tremewan, W. G., 1969. Key to the British and French Species of *Phyllonorycter* Hübner. *Ent. Gazette.*, **20**: 3-33.

Emmet, A. M., 1974. *Phyllonorycter muelleriella* Zell. in Britain. *Ent. Rec.*, **86**: 206-208.

————————, 1975. Notes on the Oak-feeding Species of *Phyllonorycter* Hübner. *Ent. Rec.*, **87**: 240-245.

Ffennell, D. W. H., 1975. Further Notes on the Oak-feeding Species of *Phyllonorycter* Hübner. *Ent., Rec.*, **87**: 245-247.

Miller, P. F., 1973. The Biology of Some *Phyllonorycter* Species Mining Leaves of Oak and Beech. *Journal of Natural History*, **7**: 391-409.

Scopula nigropunctata Hufn.: Sharp-angled Wave (Lep.: Geometridae) in 1977. — In view of the appalling summer experienced last year, it is nice to be able to record at least one local species which appeared to be present in larger numbers than usual: *Scopula nigropunctata* Hufn. I saw six specimens (all males) at m.v. light in Ham Street Woods, Kent, between 16th July (in good condition) and 15th August (in tatters). — R. G. Chatelain, 65 East Drive, Orpington, Kent.

A Previously Unrecorded Foodplant of Glyphipterix simpliciella (Stephens). — On 4th July, 1976, near Holbeton, S. Devon, a number of small larvae were seen feeding on seed of *Festuca arundinacea.* These appeared to be identical with those of *Glyphipterix simpliciella,* but no moths were bred to prove their identity.

Later that year I was shown some seeds of the same grass which looked as if they could have been eaten by a *Glyphipterix*: these had been collected by Messrs. M. Nelson and R. Keymer of the Nature Conservancy Council in a wet field near Fallin, Stirlingshire. On 24th May, 1977, I went with them to the locality and collected a number of stems of *Festuca arundinacea* showing holes similar to those made by *G. simpliciella* in cocksfoot (*Dactylis glomerata*) stems and from these the expected species in due course appeared.

Glyphipterix simpliciella larvae have been recorded hitherto only from seeds of cocksfoot and the species is well known as a pest to growers of cocksfoot seed. — E. C. Pelham-Clinton, The Royal Scottish Museum, Chambers Street, Edinburgh, EH1 1JF.